

شبکه های رایانه ای

Computer Networks

What is a computer network?

- A network is the interconnection of many computers and peripheral devices.
- Networks make it possible for users to share resources for communication (hardware) and data (software)

Networks

- Networks have 3 layers of component
- Application software
- Network software
- Network hardware

Application software

- programs that interface with network users and permit the sharing of information, such as files, graphics, and video, and resources, such as printers and disks.
- One type of application software is called client-server.
- Also peer-to-peer network

Network software

- programs that establish protocols, or rules, for computers to talk to one another.
- These protocols are carried out by sending and receiving formatted instructions of data called packets.
- Protocols make logical connections between network applications, direct the movement of packets through the physical network, and minimize the possibility of collisions between packets sent at the same time.

Network hardware

- Physical components that connect computers.
- Two important components are the transmission media that carry the computer's signals and the network adapter
- Transmitted information is in the form of binary digits, or bits (1s and 0s), which the computer's electronic circuitry can process.

Two types of connection

- Physical

the medium used to carry the signal, the geometric arrangement of the computers (topology), and the method used to share information.

- Logical (virtual)

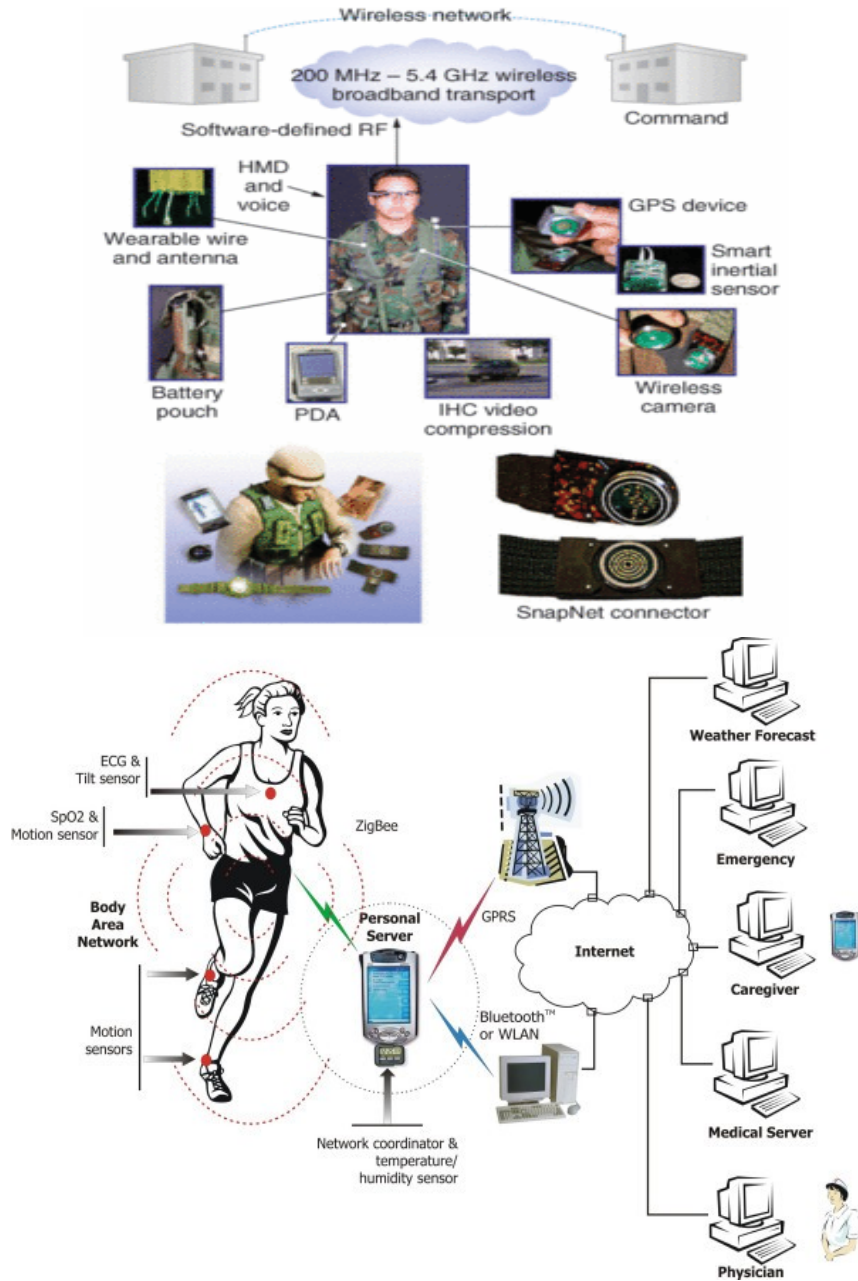
allow data sharing between applications on different types of computers, such as a Macintosh and an IBM personal computer (PC), in a network

Networks

- BAN
- PAN
- HAN
- LAN
- MAN
- WAN

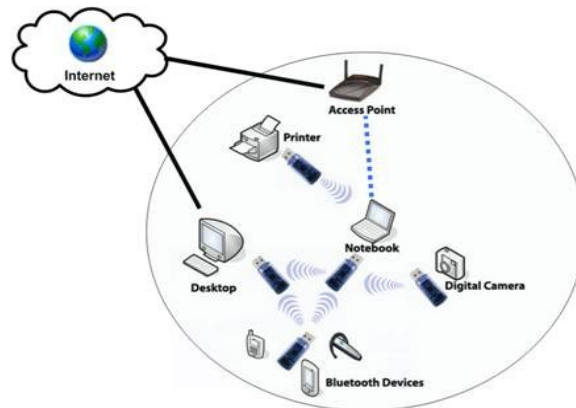
What is BAN?

- Body Area Network
- A Body Area Network means wireless communication between various components attached to the body, such as data spectacles, earphones, microphones and sensors for medical applications and for work and leisure.



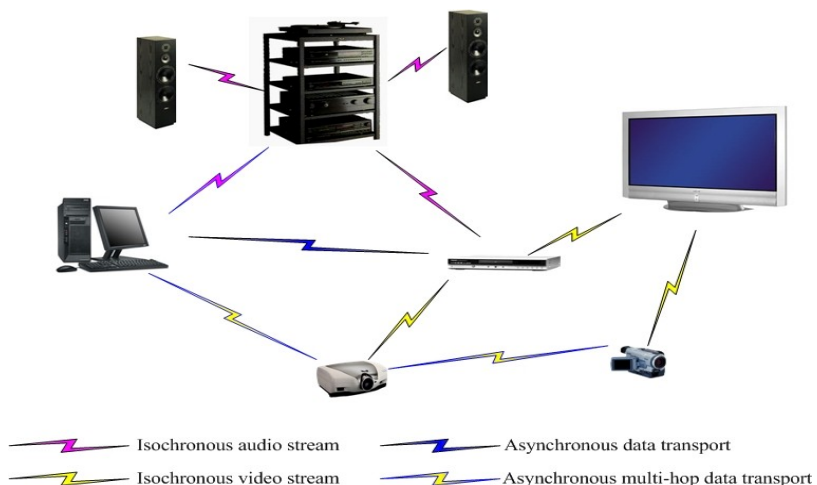
What is PAN?

- Personal Area Network
- The PAN is a wireless LAN with a very short range (up to 10 meters). PANs are used to connect devices, such as a PDA, keyboard, mouse, printer, etc. that a single person uses with their computer. PANs enable easier interconnection between devices by eliminating cables. Bluetooth* is a technology commonly used to form a PAN.



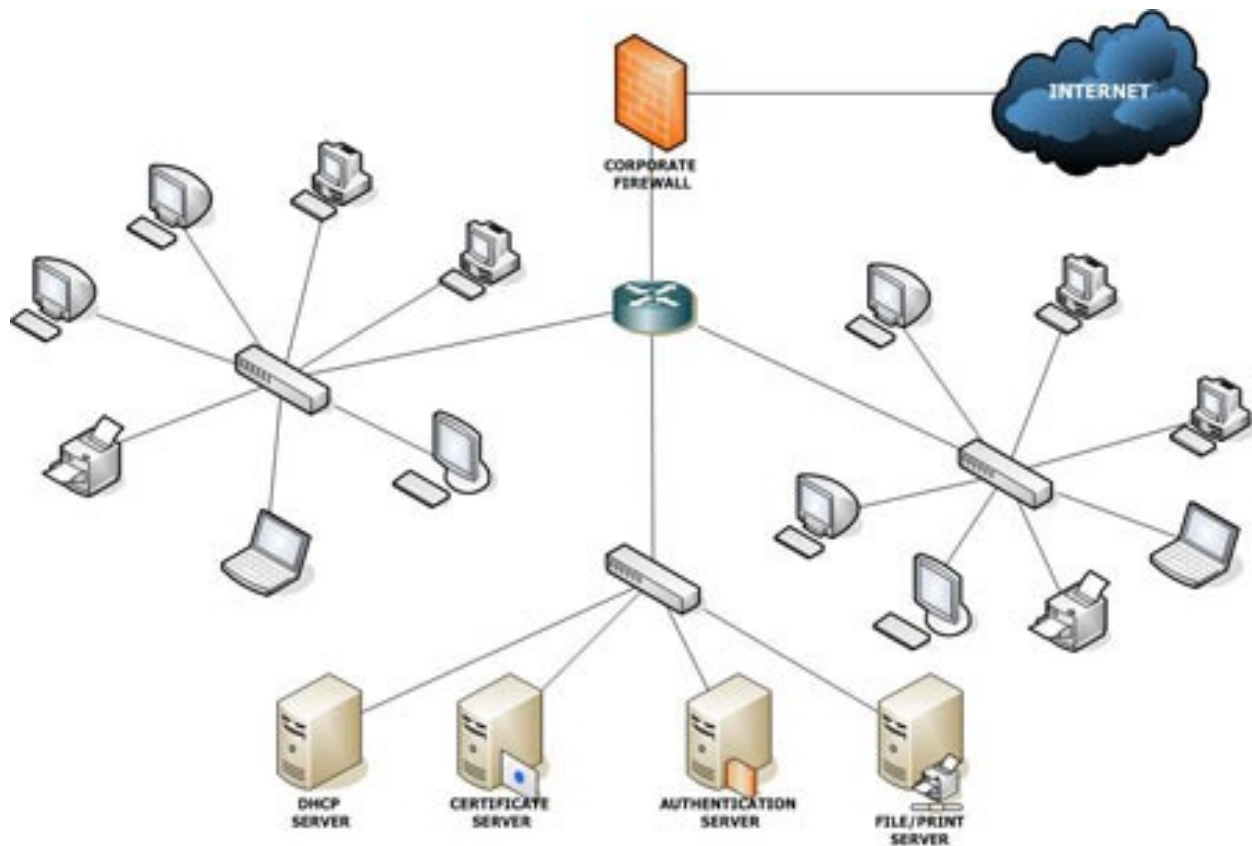
What is HAN?

- Home Area Network
- A HAN is a network contained within a user's home that connects a person's digital devices, from multiple computers and their peripheral devices to telephones, VCRs, televisions, video games, home security systems, "smart" appliances, fax machines and other digital ...



What is LAN?

- Local Area Network
- A network in which the computer systems are all situated relatively close to each other. E.g. Building or cluster of buildings
- Distance between the network is small



Topology

- Point-to-point
- Mesh
- Bus
- Ring
- Star
- Hybrid

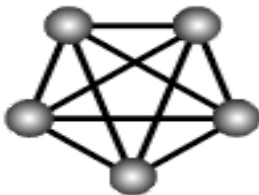
Point-to-point

- Simplest connection
- One computer connect to another computer



Mesh

- Every Computer Connected To all other computers.
- There are one dedicated link between every two computers.



Mesh

Bus

- Each node is connected to one main communications line.

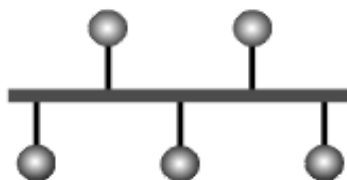
With this arrangement,

even if one of the

nodes goes down,

the rest of the network

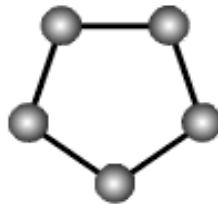
can continue to function normally.



Bus

Ring

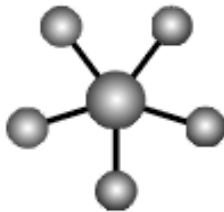
- Messages travel in one direction around a ring from node to node.
- As each node receives a message, it checks the message address.
- If the message is not for that particular node, the message is regenerated and passed on.
- This regeneration allows messages to travel farther in a ring network than in other network configurations.



Ring

Star

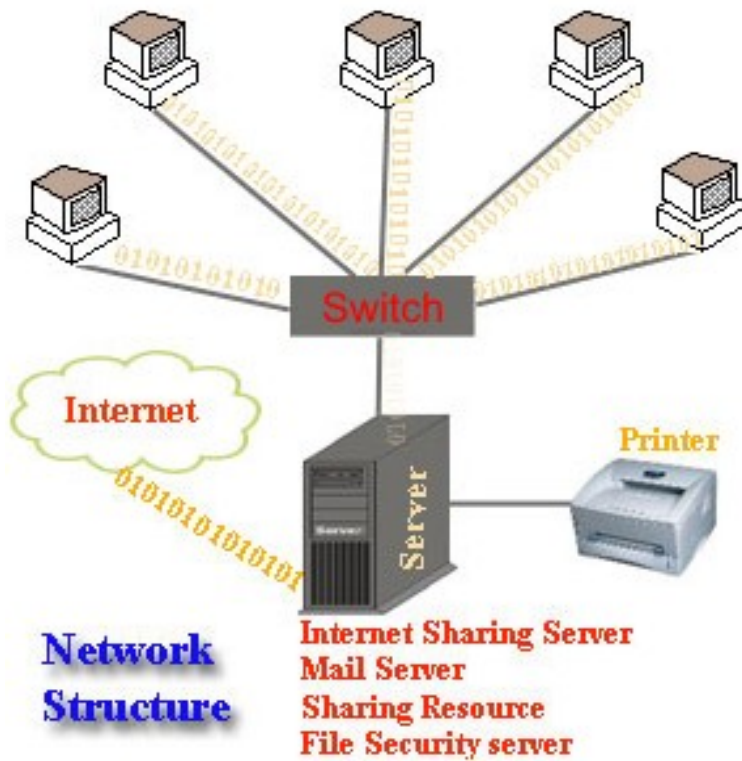
consists of several nodes connected to a central Switch in a star-shaped configuration. Messages from individual nodes pass directly to the switch, which determines any further routing



Star

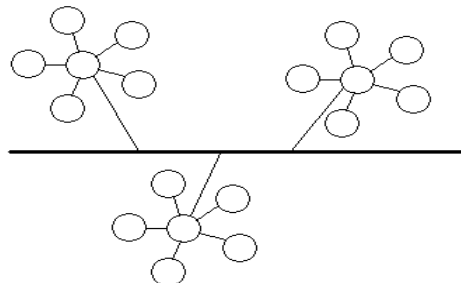
What is a Switch?


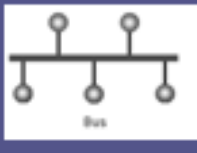
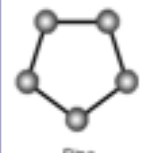

- A switch is a network device that selects a path or circuit for sending a unit of data to its next destination
- a network traffic monitoring device that controls the flow of traffic between multiple network nodes



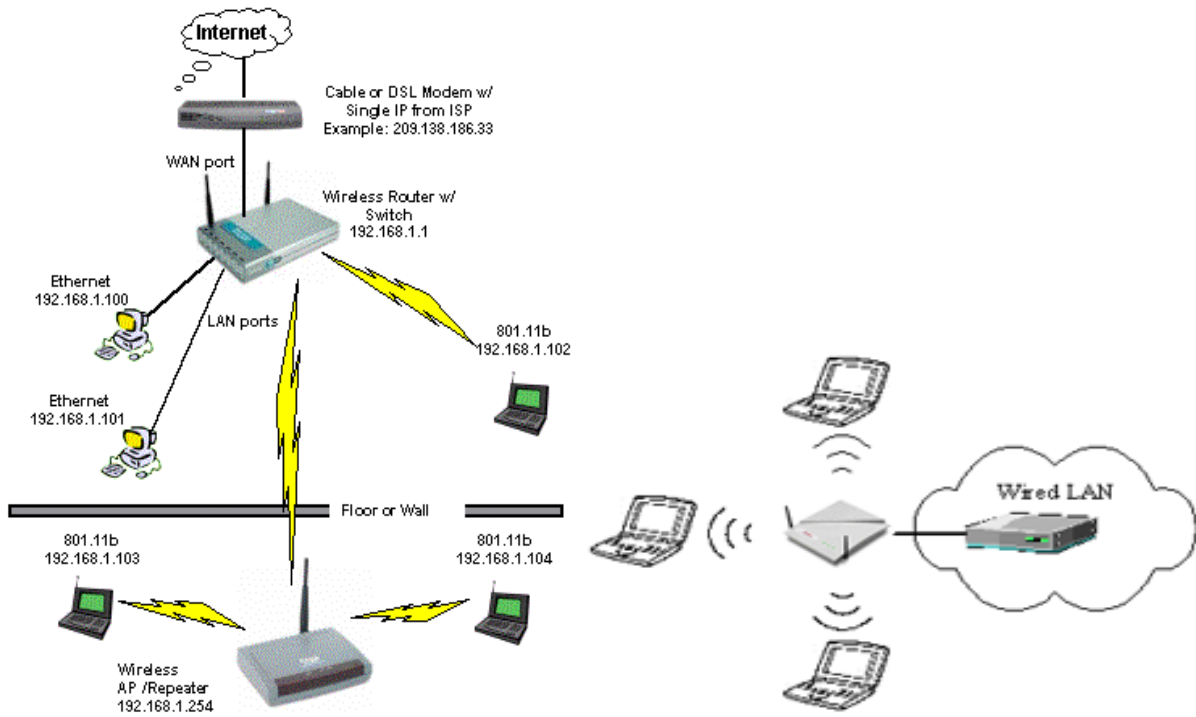
Hybrid

- Hybrid topology is the combination of 2 or more topologies. By this topology, we can have the best of 2 or more topologies.



Topology	 Mesh	 Bus	 Ring	 Star
Speed	High	Low	Low	High
Traffic	Low	High	High	Low
Cost	High	Low	Low	Low
Fault Tolerance	High	Low	Low	High

Wireless LAN

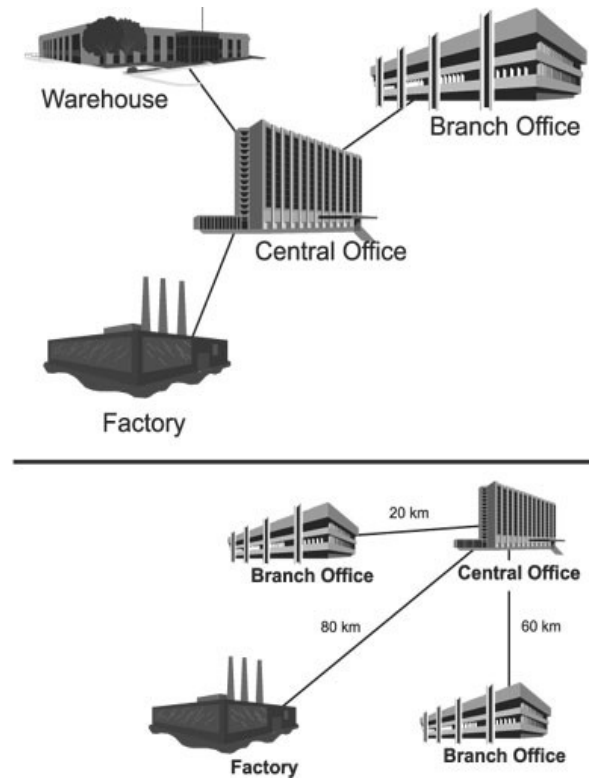


Access Point



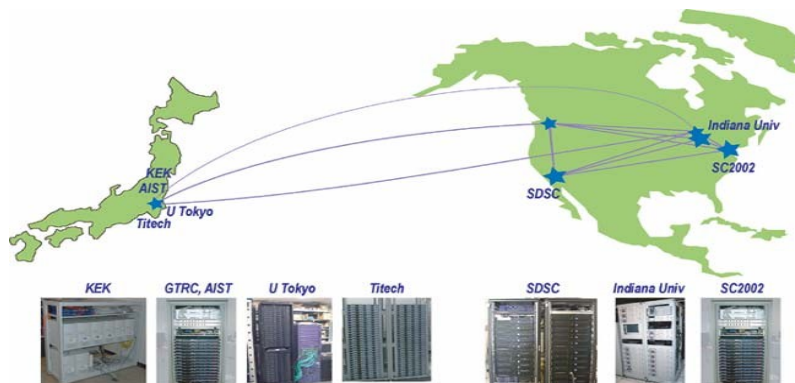
What is MAN?

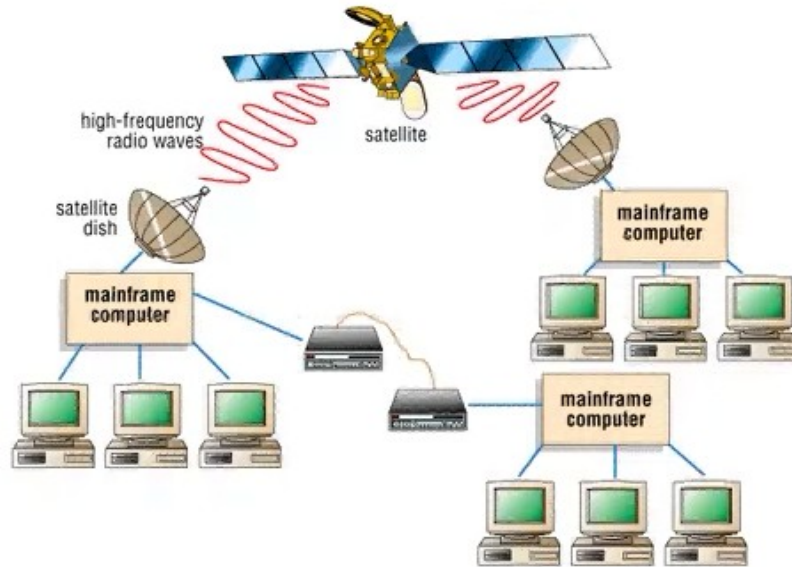
- **M**etropolitan **A**rea **N**etwork
- A communications network that covers a geographic area such as a city or suburb.



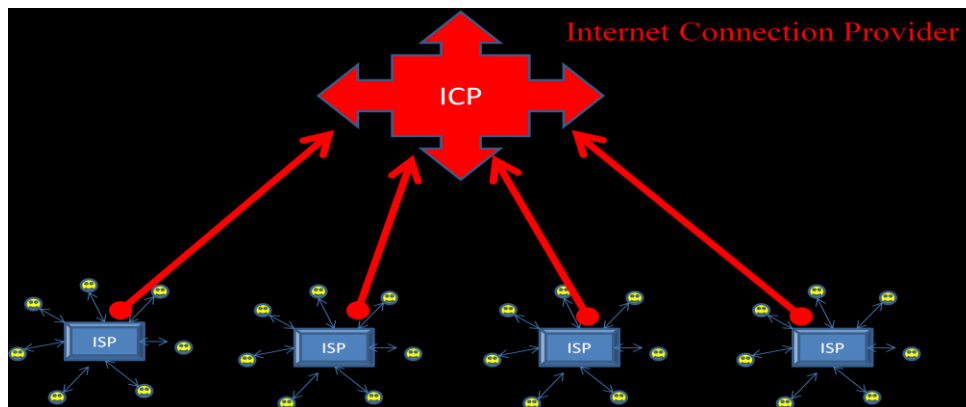
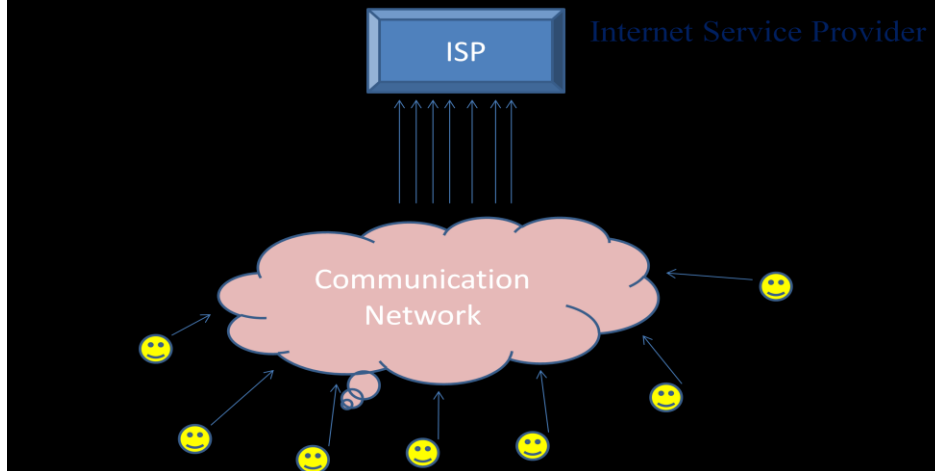
What is WAN?

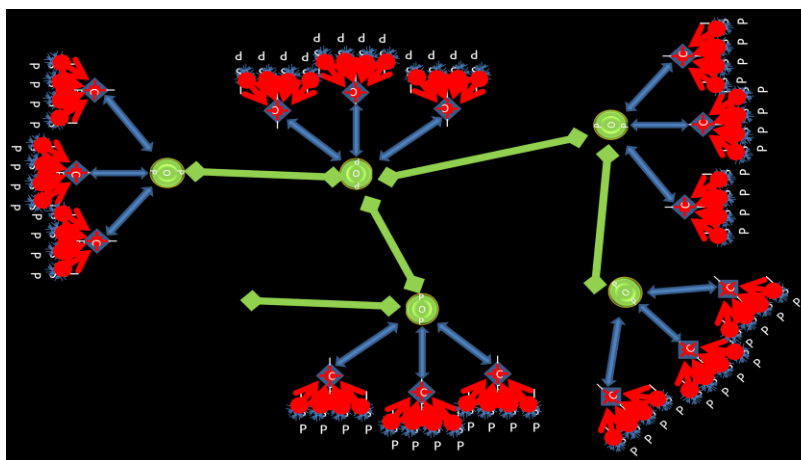
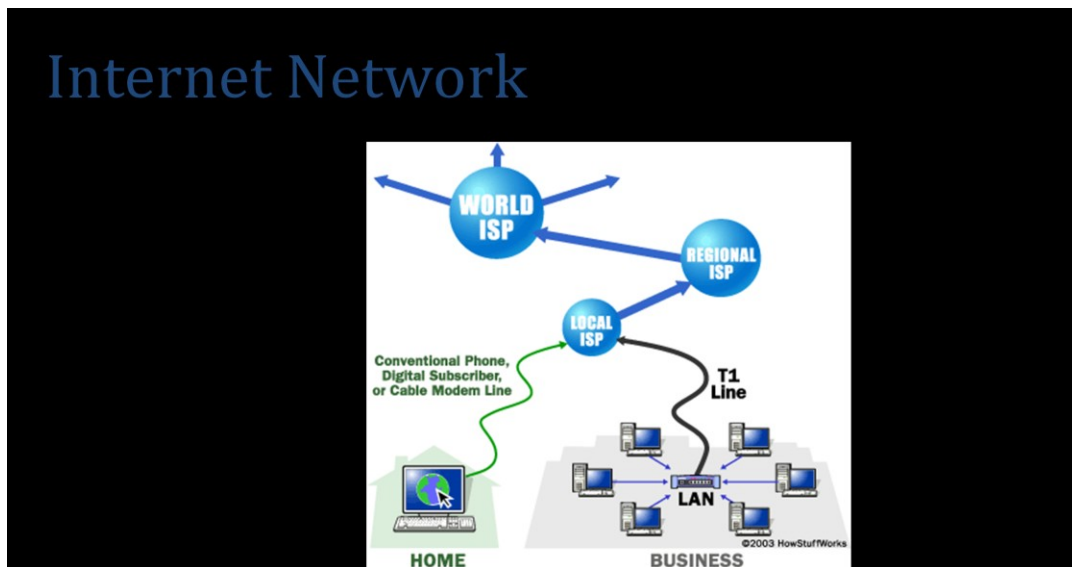
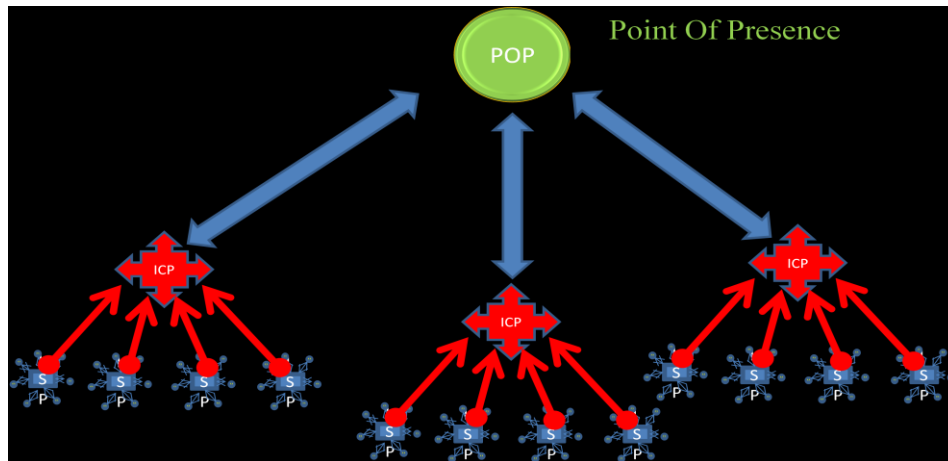
- A network in which the computers are geographically remote. Wide area networks make use of a range of connection methods including communication satellites

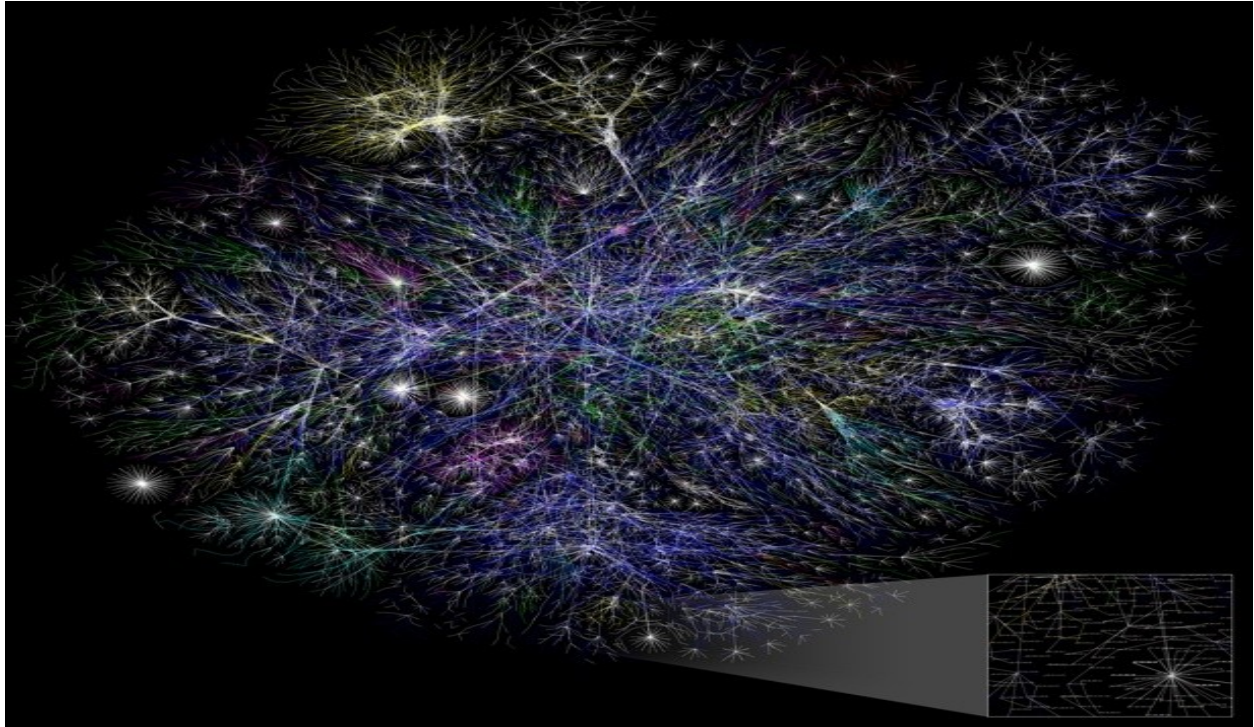




Internet Network



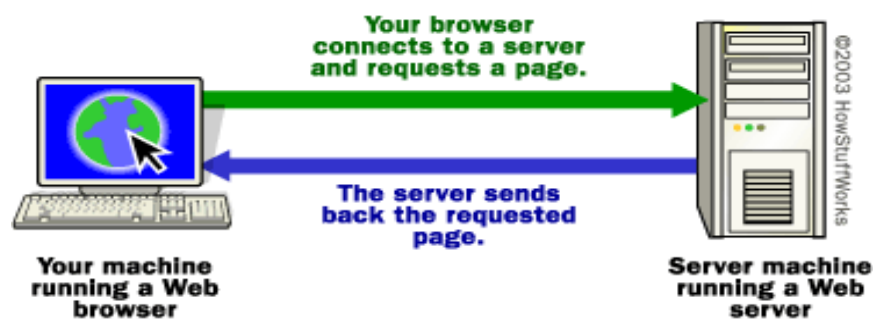


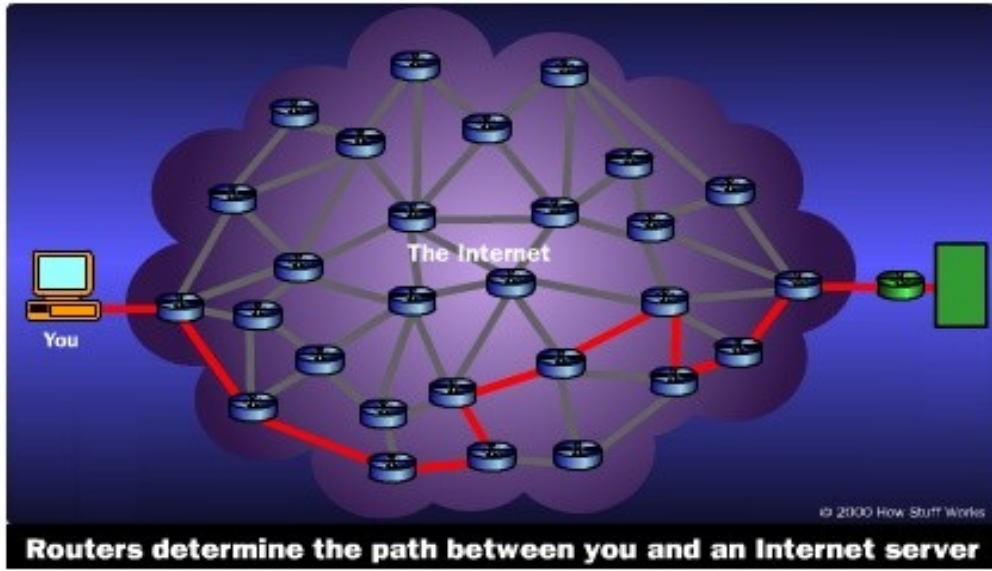


Internet Services

- Web Service
- Email Service
- ...

Web Service

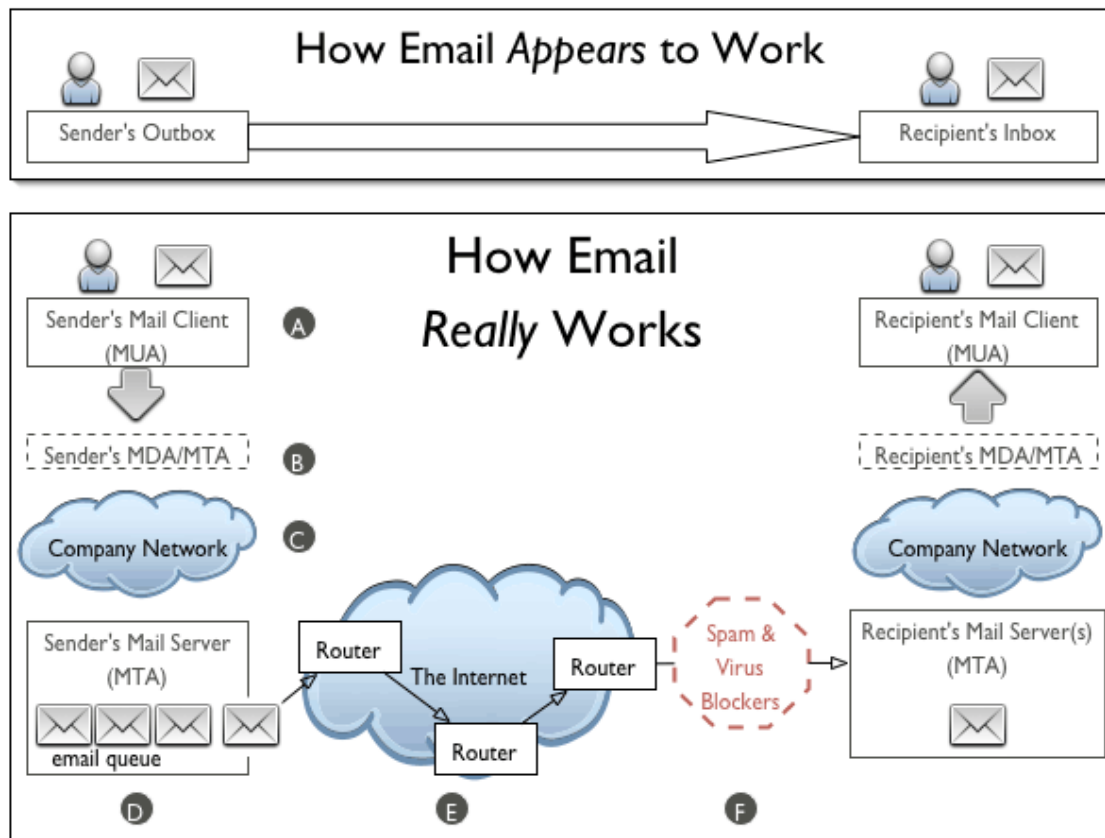




Email Service (Local)



Email Service (Internet)



Two categories of networks

- Networked systems : consist of many networked computers
- Distributed system :also consist of multiple computers which have the ability to share not only data but also computing power

What is a terminal?

- It is a computer or computer-controlled device operating on a network.
- For example, a supermarket network will probably have standard computers for its office and a POS terminal at the checkout counter.



What is a server?

- A server is a works station which provides a resource that can be used by any authorised client station

Different types of servers

File server

Printer server

CD-Rom Server

Database server

